WE CLAIM:

1. A method for detecting an oxidation enzyme comprising the steps of:
   (a) contacting a test enzyme with a substrate and an oxygen donor to promote the formation of a *cis*-dihydrodiol from the substrate and the oxygen donor;
   (b) subjecting the *cis*-hydrodiol to acidic conditions to promote the formation of a phenol from the *cis*-dihydrodiol;
   (c) contacting the phenol with 2,6-dichloroquinone-4-chloroimide (Gibbs reagent) under neutral conditions to promote the formation of a detectable composition; and
   (d) testing for the detectable composition, wherein the presence of the detectable composition indicates that the test enzyme is an oxidation enzyme.

2. The method of claim 1, wherein the oxidation enzyme is selected from the group consisting of a monooxygenase enzyme and a dioxygenase enzyme.

3. The method of claim 1, wherein the oxidation enzyme is selected from the group consisting of toluene dioxygenase, biphenyl dioxygenase, naphthalene dioxygenase, methane monooxygenase, chloroperoxidase, cytochrome P450, phenol hydroxylase, dehalogenase, and microperoxidase.

4. The method of claim 1, wherein the test enzyme is a mutant enzyme or a wild-type enzyme.

5. The method of claim 1, wherein the substrate is selected from the group consisting of an aromatic hydrocarbon and a halogenated ethylene.

6. The method of claim 1, wherein the substrate is selected from benzene, toluene, t-butylbenzene, 1,2,4-trimethylbenzene, flurorbenzene, chlorobenzene, bromobenzene, iodobenzene, benzoic acid, p-methoxybenzoic acid, 2-napthoic acid, benzamide, pyridine, and 4-picoline.

7. The method of claim 1, wherein the oxygen donor is selected from the group consisting of molecular oxygen and a peroxide.

8. The method of claim 1, wherein the acidic conditions are provided by lowering the pH to about 2.5.

9. The method of claim 1, wherein the neutral conditions are provided by increasing the pH to within the range from about 7 to about 9.

10. The method of claim 1, wherein the test enzyme is expressed in a host cell, and the substrate and oxygen donor contacted with the host cell.

11. The method of claim 10, wherein the host cell comprises a plasmid comprising a gene encoding the test enzyme.

12. The method of claim 10, wherein the host cell is attached to a solid support.

13. The method of claim 12, wherein the solid support is selected from the group consisting of agar and a membrane.

14. The method of claim 12, wherein colonies of multiple host cells are spread on the solid support.

15. The method of claim 1, wherein the detectable composition is a colored product detectable by visual inspection, spectrometry, or digital imaging.

16. A method for detecting an oxidation enzyme comprising the steps of:
    (a) contacting an test enzyme with a substrate to promote the formation of a *cis*-dihydrodiol from the substrate;
    (b) contacting the *cis*-hydrodiol with *cis*-dihydrodiol dehydrogenase to promote the formation of a catechole from the *cis*-hydrodiol;
    (c) contacting the catechol with 2,6-dichloroquinone-4-chloroimide (Gibbs reagent) to promote the formation of a detectable composition; and
    (d) testing for the detectable composition, wherein the presence of the detectable composition indicates that the test enzyme is an oxidation enzyme.

17. The method of claim 16, wherein the oxidation enzyme is selected from the group consisting of a monooxygenase enzyme and a dioxygenase enzyme.

18. The method of claim 16, wherein the oxidation enzyme is selected from the group consisting of toluene dioxygenase, biphenyl dioxygenase, naphthalene dioxygenase, methane monooxygenase, chloroperoxidase, cytochrome P450, phenol hydroxylase, dehalogenase, and microperoxidase.

19. The method of claim 16, wherein the test enzyme is a mutant enzyme or a wild-type enzyme.

20. The method of claim 16, wherein the substrate is selected from the group consisting of an aromatic hydrocarbon and a halogenated ethylene.

21. The method of claim 16, wherein the substrate is selected from benzene, toluene, t-butylbenzene, 1,2,4-trimethylbenzene, flurorbenzene, chlorobenzene, bromobenzene, iodobenzene, benzoic acid, p-methoxybenzoic acid, 2-napthoic acid, benzamide, pyridine, and 4-picoline

22. The method of claim 16, wherein the oxygen donor is selected from the group consisting of molecular oxygen and a peroxide.

23. The method of claim 16, wherein the test enzyme is expressed in a host cell, and the substrate and oxygen donor are contacted with the host cell.

24. The method of claim 23, wherein the host cell also expresses *cis*-dihydrodiol dehydrogenase.

25. The method of claim 24, wherein the host cell comprises a plasmid comprising genes encoding the test enzyme and cis-dihydrodiol dehydrogenase.

26. The method of claim 23, wherein the host cell is attached to a solid support.

27. The method of claim 26, wherein the solid support is selected from the group consisting of agar and a membrane.

28. The method of claim 26, wherein colonies of multiple host cells are spread on the solid support.

29. The method of claim 16, further comprising contacting cis-dihydrodiol dehydrogenase with a coenzyme.

30. The method of claim 28, wherein the coenzyme is NAD^+.

31. The method of claim 16, wherein the detectable composition is a colored product detectable by visual inspection, spectrometry, or digital imaging.

32. A method for detecting an oxidation enzyme comprising the steps of:

(a) contacting an test enzyme with a substrate to promote the formation of a product from the substrate;

(b) contacting the product with an agent to promote the formation of a modified product, wherein the modified product is selected from the group consisting of a phenol and a catechol;

(c) contacting the modified product with 2,6-dichloroquinone-4-chloroimide (Gibbs reagent) to promote the formation of a detectable composition; and

(d) testing for the detectable composition, wherein the presence of the detectable composition indicates that the test enzyme is an oxidation enzyme.

33. The method of claim 32, wherein the oxidation enzyme is selected from the group consisting of a monooxygenase enzyme and a dioxygenase enzyme.

34. The method of claim 32, wherein the oxidation enzyme is selected from the group consisting of toluene dioxygenase, biphenyl dioxygenase, naphthalene dioxygenase, methane monooxygenase, chloroperoxidase, cytochrome P450, phenol hydroxylase, dehalogenase, and microperoxidase.

35. The method of claim 32, wherein the test enzyme is a mutant enzyme or a wild-type enzyme.

36. The method of claim 32, wherein the test enzyme is expressed in a host cell, and the substrate and oxygen donor are contacted with the host cell.

37. The method of claim 32, wherein the substrate is selected from the group consisting of an aromatic hydrocarbon and a halogenated ethylene.

38. The method of claim 32, wherein the substrate is selected from benzene, toluene, t-butylbenzene, 1,2,4-trimethylbenzene, flurorbenzene, chlorobenzene, bromobenzene, iodobenzene, benzoic acid, p-methoxybenzoic acid, 2-napthoic acid, benzamide, pyridine, and 4-picoline

39. The method of claim 32, wherein the oxygen donor is selected from the group consisting of molecular oxygen and a peroxide.

40. The method of claim 32, wherein the product is selected from a cis-dihydridiol, an alkylated benzene, a halogenated benzene, and a carboxylated benzene.

41. The method of claim 40, wherein the product is anthranilic acid

42. The method of claim 32, wherein the agent is an acid.

43. The method of claim 32, wherein the agent is an enzyme.

44. The method of claim 42, wherein the enzyme is a second oxidation enzyme.

45. The method of claim 43, wherein the product is a *cis*-dihydrodiol and the second oxidation enzyme is a *cis*-dihydrodiol dehydrogenase.

46. The method of claim 43, wherein the product is a halogenated benzene, and the second oxidation enzyme is a dehalogenase.

47. The method of claim 43, wherein the product is selected from the group consisting of alkylated and carboxylated benzene, an the second oxidation enzyme is selected from the group consisting of cytochrome P450 and a peroxidase.

48. The method of claim 43, wherein the product is anthranilic acid, and the second oxidation enzyme is anthranilite monooxygenase.

49. The method of claim 36, wherein the host cell also expresses a second oxidation enzyme, which second oxidation enzyme promotes the formation of a modified product.

50. The method of claim 49, wherein the host cell comprises a plasmid comprising genes encoding the test enzyme and the second oxidation enzyme.

51. The method of claim 49, wherein the product is a cis-dihydrodiol and the second oxidation enzyme is a *cis*-dihydrodiol dehydrogenase.

52. The method of claim 51, further comprising contacting the *cis*-dehydydiol dehydrogenase with NAD^+.

53. The method of claim 36, wherein the host cell is attached to a solid support.

54. The method of claim 53, wherein the solid support is selected from the group consisting of agar and a membrane.

55. The method of claim 53, wherein colonies of multiple host cells are spread on the solid support.

56. The method of claim 32, wherein the detectable composition is a colored product detectable by visual inspection, spectrometry, or digital imaging.

57. A method for detecting an oxidation enzyme comprising the steps of:

(a) contacting test enzyme with a substrate to promote the formation of a phenol ether, wherein the hydroxyl-group is attached to the aromatic part of the phenol ether;

(b) contacting the phenol ether with 2,6-dichloroquinone-4-chloroimide (Gibbs reagent) to promote the formation of a detectable composition; and

(c) testing for the detectable composition, wherein the presence of the detectable composition indicates that the test enzyme is an oxidation enzyme.

58. The method of claim 57, wherein the oxidation enzyme is cytochrome P450.

59. The method of claim 57, wherein the test enzyme is a mutant enzyme or a wild-type enzyme.

60. A method for detecting an oxidation enzyme comprising the steps of:

(a) contacting a test enzyme with a substrate to promote the formation of a phenol ether, wherein the hydroxyl-group is attached to the ether part of the phenol ether;

(b) allowing the phenol ether to dissociate into an aldehyde and a phenol;

(c) contacting the phenol with 2,6-dichloroquinone-4-chloroimide (Gibbs reagent) to promote the formation of a detectable composition; and

(d) testing for the detectable composition, wherein the presence of the detectable composition indicates that the test enzyme is an oxidation enzyme.

61. The method of claim 60, wherein the oxidation enzyme is cytochrome P450.

62. The method of claim 60, wherein the test enzyme is a mutant enzyme or a wild-type enzyme.